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Abstract

Since the prevalence of many chronic health conditions increases with age we might anticipate that as the population ages the proportion with one or more such conditions would rise, as would the cost of treatment. We ask three questions: How much would the overall prevalence of chronic conditions increase in a quarter century if age-specific rates of prevalence did not change? How much would the requirements for health care resources increase in those circumstances? How much difference would it make to those requirements if people had fewer chronic conditions? We conclude that the overall prevalence rates for almost all conditions associated mostly with old age would rise by more than 25 percent and that health care requirements would grow more rapidly than the population – more than twice as rapidly in the case of hospital stays – if the rates for each age group remained constant. We conclude also that even modest reductions in the average number of conditions at each age could result in substantial savings.

Key Words: Chronic conditions, aging population, health care resources

JEL Classification: I10, J14

Chronic Health Conditions: Changing Prevalence in an Aging Population and Some Implications for the Delivery of Health Care Services

Frank T. Denton and Byron G. Spencer[1]

1. Introduction

The World Health Organization (WHO) projected that chronic diseases would account for 89 percent of all deaths in Canada in 2005 (WHO, undated). Since the prevalence of many chronic health conditions increases with age we might anticipate that as the population ages there will be a rise in the proportion with one or more such conditions, and that their treatment will make increasing demands on the health care system. In the words of Epping-Jordan et al. (2004), "Chronic conditions are increasingly the primary concern of health care systems". Such considerations lead us to ask three questions: How much would the overall prevalence of chronic conditions increase in the next quarter century if age-specific rates of prevalence did not change? How much would the requirements for health care resources increase in those circumstances? And, finally, how much difference would it make to those requirements if people had fewer chronic conditions?

We proceed as follows. In the next section we note that there is no generally accepted definition of the term *chronic condition* and that measures of prevalence vary widely. We then present measures based on one recent survey to show how prevalence varies by age for a wide variety of conditions that are defined as *chronic* in that survey. Section 3

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considers how the population-wide prevalence rates for those conditions will change over the next quarter century in consequence of projected changes in age distribution, other things equal. As people age it is not uncommon for them to have more than one chronic condition and, as we document, the use of health care resources tends to increase not only with age but also with number of conditions. Section 4 explores that relationship further, provides projections of future requirements for selected health care services, and assesses the impact that a hypothetical reduction in the number of chronic conditions per capita would have on the use of health care resources. Concluding observations are provided in section 5.

2. Prevalence of Chronic Conditions

Many definitions of *chronic conditions* appear in the literature. For example,

> "A chronic condition is ... one that lasts or is expected to last a year or longer, limits what a person can do, and may require ongoing care. ..." (John Hopkins Bloomberg School of Public Health http://www.partnershipforsolutions.org/)

> "... one lasting 3 months or more" ... adding that "Chronic diseases generally cannot be prevented by vaccines or cured by medication, nor do they just disappear." (MedicineNet website http://www.medicinenet.com/script/main/hp.asp, quoting the U.S. National Center for Health Statistics)

> "[any] long-term health conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional." (Gilmour and Park, 2005, p 26)

Such proliferation has led O'Halloran et al. (2004, p 381) to observe that "With the increasing prevalence of chronic conditions, there is need for a standardized definition

of chronicity for use in research, to evaluate the population prevalence and general practice management of chronic conditions." That conclusion is echoed by van der Lee et al. (2007, p 2741) who report "... wide variability in reported prevalence rates, surprisingly enough, from *0.2 to 44.0 percent*" [italics added] for chronic conditions in childhood, and conclude that "... international consensus about the conceptual definition of chronic health conditions ... is needed".

It is thus evident that definitions vary widely and that reported prevalence rates are extremely sensitive to what is measured and how the measurement is done. One remains at the mercy of (and limited by) available survey data. Not withstanding the concerns, we find it informative in what follows to use the Statistics Canada *Canadian Community Health Survey* (CCHS) to investigate age prevalence patterns for a range of chronic conditions and to explore the implications for health care utilization. We use the confidential master file for CCHS cycle 3, which relates to the year 2005. The survey sampled approximately 130,000 individuals in the period January to December of 2005. The target population was persons aged 12 years or older living in private dwellings in the ten provinces and three territories. Persons living on Indian Reserves or Crown lands, residents of institutions, full-time members of the Canadian Armed Forces and residents of certain remote regions were excluded from the survey. The CCHS covered approximately 98% of the Canadian population aged 12 or older. Both personal and telephone interviews were conducted, using computer-assisted interviewing software.[2] The questionnaire presented to respondents contained the following statement:

> Now I'd like to ask about certain chronic health conditions which you may have. We are interested in "long-term conditions" which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional.

[2] Further information about the survey is provided on the Statistics Canada website http://www.statcan.ca/english/concepts/health/cycle3_1/overview.htm.

The questionnaire then proceeded through a checklist of conditions which Statistics Canada defined as *chronic*. The conditions are generally similar to those identified in population health surveys elsewhere, but we note that the checklist itself varies somewhat, even from one Statistics Canada survey to another, and that the choice of what to include appears to reflect the result of interdepartmental negotiations as much as a set of coherent principles. Nonetheless, in what follows we work with the conditions defined as chronic in CCHS cycle 3.

Table 1 shows prevalence rates in broad age groups for each of 32 conditions identified as chronic in the survey. They are ordered in terms of prevalence in the oldest age group (80 and older) relative to those in the age group 30-49. For the 14 conditions in the upper panel the relative prevalence rates exceed two; it is evident from the table and from Figure 1 that these are conditions whose prevalence increases strongly with age. In the lower panel are 18 conditions less strongly associated with age.[3] In cases such as autism and learning disability, the age relationship is reversed. One might speculate that relative prevalence rates less than 1.0 are the result of lower survival rates for some such cases.[4]

The overall prevalence rates are reported in the bottom line of the table ("has chronic condition"). They may seem high – more than two-thirds of the population over the age of 12 report having a chronic condition, and more than 90 percent of those over the age

[3] No information is available about what specific conditions are included in the category "other long-term conditions"; it is based on respondents' answers to a question about whether they "have any other long-term physical or mental health condition that has been diagnosed by a health professional".

[4] Alternatively it might be a cohort effect: autism and learning disabilities are usually diagnosed at a young age, and health professionals might have been less likely to have diagnosed a learning disability among those now in the older age groups than among those now in middle age or younger. We are grateful to a referee for this observation.

of 65. However, similar numbers are reported in various studies in the US[5], although the set of conditions included differs from one study to another. (As one example, "hearing impairment" is included as a chronic condition in the US survey referred to in footnote 5, but not in CCHS cycle 3.)

The overall prevalence rates are affected by the age distribution of the population as it was in 2005. Given that distribution, the highest all-age rates are for non-food allergies (26.6 percent of the population) and back problems (18.8 percent), two chronic conditions that are not concentrated at older ages but instead occur in about the same proportions at most ages. Next in line are arthritis or rheumatism (16.4 percent) and high blood pressure (14.9 percent), both of which are about six times more likely to be present among those 80 and older than those 30-49. Most of the other conditions affect much smaller proportions of the population.

Of the 14 that are concentrated at older ages, arthritis/rheumatism and high blood pressure each affect about half the population aged 80 and older, cataracts and heart disease more than a quarter each, and urinary incontinence, thyroid problems, and diabetes more than an eighth. There are nine conditions for which the *relative* prevalence rates for the age group 80+ exceed 10; each of the first nine conditions listed in Table 1 is more than 10 times as prevalent among those in the oldest age group as among those aged 30-49 (and more than seven times more prevalent even among those 65-79). Overall, and not surprisingly, chronic conditions thus exhibit very strong age patterns.

Two general observations of a qualifying nature are in order. First, the prevalence rates relate to the survey target population rather than to the entire population. Of particular importance for present purposes is the exclusion of residents of institutions. Since such

[5] "Eighty-eight percent of Americans over 65 years of age have at least one chronic health condition (as of 1998)", http://www.medicinenet.com/script/main/hp.asp – as one example.

institutions include nursing homes and other long-term care facilities, the exclusion relates to a segment of the population that is especially likely to experience multiple chronic conditions. This restriction of our analysis is regrettable because it means that the prevalence rates as reported in Table 1 no doubt underestimate the rates for the population as a whole, and especially for older age groups. As an important example, the prevalence rate of 4.3 percent for Alzheimers disease or other dementia for those 80 and older would undoubtedly be much higher if residents of long-term care facilities were included. Without appropriate survey information we are unable to estimate how much higher[6].

The second qualifying observation is that the classification itself provides no indication of the severity of the conditions identified[7]. Thus, for example, while 30 percent of the population 80 and older report having cataracts at the time of the survey, we might expect that many of them could benefit from surgery and, in time, would not continue to have the problem. As a further example, a few months after the survey some of those who reported having cancer might be free of symptoms, and possibly cured, while others would have died from the disease. Persons 80 and over are of course those who survived to that age and their prevalence rates do not reflect the fact that chronic disease may have caused others to die younger.

3. Projection of Prevalence Rates for Chronic Conditions

We turn now to the future. The expectation is that as the large baby boom cohort moves into older age categories the overall proportion of the population with chronic conditions will increase. The question (for our purposes) is how much – how much, that is, if the

[6] While we do not have information about their health characteristics, based on comparisons with Statistic Canada comprehensive population estimates for 2005, it appears that the survey misses about 20 percent of those 80 and older, the largest proportion of whom would be in long-term care facilities.

[7] The survey does provide information relating to functional abilities, an aspect taken into account by Gilmour and Park (2005).

age-specific prevalence rates remain the same and only the population age distribution changes?[8]

Table 2 shows the projected population to 2030 on which our calculations are based. The projection relates to the "target population" as defined in the CCHS; it is derived from a MEDS projection[9], but adjusted to the target population of the survey by assuming that the fractions of the population at each age in the CCHS excluded categories remain fixed. Fertility and mortality rates are held constant in the projection. One might expect mortality rates to fall, and in consequence life expectancy to increase somewhat over the projection period. However, keeping mortality rates fixed is a natural concomitant of the assumption that prevalence rates are constant. Mortality and disease prevalence obviously are not independent: one would expect a positive correlation between mortality rates and the prevalence of chronic conditions. Holding mortality rates constant allows us to focus strictly on the effects of changes in the population age distribution.[10]

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[8] Changes in the overall age distribution will be accompanied by changes also in the visible minority and urban/rural composition as well as in other dimensions. A referee has observed, quite correctly, that such changes could, in principle, affect the projected proportions with various chronic differences. To address the concern we compared the "white" and "visible minority" proportions with heart disease, high blood pressure, and chronic obstructive pulmonary disease. After controlling for age, the differences are quite small in most cases – less than 1 percentage point in half of the age-group-chronic-condition cells. Larger differences, when they arise, often change sign from one age group to another, an outcome that results from the small sample of visible minority individuals with specified chronic conditions in particular age groups. We conclude that while there are undoubtedly differences across various population groupings in the prevalence of at least some chronic conditions, we do not have sufficient information to take them into account in the projections that follow.

[9] MEDS stands for Models of the Economic-Demographic System. For a description of MEDS, see Denton et al. (1994, 2005).

[10] In what follows we report results based on only one population projection. As explained, mortality rates are held constant for analytical reasons. The effects of alternative rates of fertility and immigration are not reported in detail, in order to avoid a proliferation of tables, but a few comments are in order. The projection as reported extends to 2030, or just over two decades. Higher fertility rates would increase the size of the population under the age of twenty, and hence the proportion in that age group.

The table shows growth in the overall population of 20 percent between 2005 and 2030. However, consistent with population aging and constant fertility rates (and in spite of high levels of immigration), the rate of growth declines from 5.7 percent in the first five-year period to 2.2 percent in the final one. Proportionate declines are observed in the age groups under 50 and proportionate increases in those over 65.

The projected overall prevalence rates for each of the 32 chronic conditions are shown in Table 3. Note that if the population *in each age group* had increased by 20 percent, with unchanged age-specific prevalence rates, the number with each condition would also have increased by 20 percent and the overall prevalence rates would have remained the same. However, with the projected shift in age distribution one would anticipate changes in prevalence.

That is of course what we find. In consequence of changes in the age distribution alone, the overall chronic condition prevalence rate ("has chronic condition") increases by 4.7 percent (from 68.7 to 71.9) over the 25-year period. At the same time there are substantial increases (more than 10 percent) in the prevalence rates of conditions associated mostly with old age – those in the upper panel of Table 3 – and modest increases or decreases in other conditions – those in the lower panel. The increase exceeds one-quarter for 12 of the 14 conditions in the upper panel, including the two that are most common in old age – arthritis or rheumatism and high blood pressure – and exceeds 10 percent in all 14. There is a decrease in the prevalence rates for 11 of the 18 conditions in the lower panel.

Since young people have very few chronic conditions, that would reduce the overall prevalence rates, but have no effect on the rates for age groups older than 20. Sustained higher immigration would have very little effect on the age distribution of the population, and hence little effect on the overall prevalence rates.

4. Use of Health Care Resources

Table 4 shows how the number of chronic conditions varies by age. While almost three-quarters of the youngest group had either no such condition or only one, more than three-quarters of the oldest group (80+) had two or more. In what follows we investigate the relationship between the use of health care resources on the one hand and the number of chronic conditions and age on the other. In doing so we ignore which chronic conditions apply and consider only the total number, as reported by respondents[11].

Survey respondents were asked to recall how many nights in the last 12 months they had spent in hospitals or other inpatient institutions and the number of visits to family physicians, eye specialists, and other physician specialists during that period[12]. Their responses are tabulated in Table 5. Those with more chronic conditions spent longer in hospitals or other health care institutions and had more consultations. The differences are pronounced: the 17 percent with two chronic conditions spent nearly four times as long in institutions and had twice as many physician visits, on average, as the 31 percent with no such conditions.

What are the implications for future health care needs as the population ages? There is a considerable body of evidence to suggest that there is room for improvement in the

[11] The survey itself provides no information about the extent to which the use of health resources is associated with each chronic condition. In future work we intend to estimate the resource use associated with the treatment of specific chronic conditions rather than simply the number of them – but the present approach is informative, we think.

[12] No further information about specialist visits was collected in the survey, and hence we are limited to the categories noted. In related work we were concerned with the impact of population aging on the need for the services of the full range of physician specialties. We found, for example, that in Ontario aging alone would suggest especially large increases in the need for thoracic/cardiovascular surgeons, ophthalmologists, and urologists combined with only small increases in the case of pediatricians, obstetricians/gynecologists, and psychiatrists. See Denton, Gafni, and Spencer (2001, 2002, 2003).

ways in which health care resources are used. In the words of Kane et al. (2005, p xvii), "we live in a health care system that is out of step with current demographic realities". The authors argue that the "... health care system [in the U S] ... is world class in trauma, transplantation, and other high-tech care. But the majority of people who use the system ... come with chronic illnesses that require on-going, long-term attention and management". A similar conclusion is reached by Dorland and McColl (2007, p xvi) in the Canadian context: "... a system designed to respond to acute illness, however well-funded, well-staffed, and efficient, cannot deliver adequate results in managing chronic disease". Speaking of the situation more broadly, the World Health Organization (2002, p 7) puts the same point differently: "Health care systems have evolved around the concept of infectious disease, and they perform best when addressing patients' episodic and urgent concerns. However, the acute care paradigm is no longer adequate."

While there is considerable agreement on the diagnosed mismatch between health care needs and the services that health care systems are best able to deliver, progress in remedying the situation "... has been agonizingly slow. The generally conservative health care industry presents formidable barriers to the changes in infrastructure needed to provide better chronic care.", Kane et al.(2005, p xx). Even today medical schools do little to prepare future physicians – the gatekeepers to the system – to deal with chronic conditions[13]. At the same time it is not clear whether the benefits that would flow from a system better designed to meet the health care needs of those with chronic conditions would result in a net increase or decrease in resource use. As a reference case, we investigate the implications that population aging would have for the requirements for health care services on the assumption that current patterns of use continue to apply.

[13] For example, "Only three of the ... 145 medical schools [in the US] have a full-scale department of geriatrics that requires a mandatory rotation in geriatrics for students and residents, and less than 3 percent of all medical students take even one course in geriatrics." (O'Neill and Barry, 2003, p 17).

Table 6 shows what would happen if people in each age group had the same number and combination of chronic conditions in the future as in 2005, and the treatment of those conditions involved the same use of resources as shown in Table 5. The number of patient nights would increase more than twice as rapidly as the population between 2005 and 2030 – 45 percent, compared with population growth of 20 percent – consultations with eye specialists would increase by 30 percent, and consultations with family practitioners and other medical specialists by 25 and 22 percent, respectively.

What if people had fewer chronic conditions; what savings might then result? Many conditions are the result of lifestyle choices. Broemeling et al. (2008) refer to "... proven strategies to delay or prevent the onset of chronic conditions and to improve the quality of primary health care to prevent complications, reduce the need for more expensive health services and secure a better quality of life for Canadians." The World Health Organization claims that the "most cost-effective interventions to reduce [the associated] risk factors are population-wide programmes to: (1) reduce salt in processed foods, cut dietary fat, particularly saturated fats; (2) encourage more physical activity; (3) encourage higher consumption of fruits and vegetables; and (4) cease smoking" [14]. That suggests that successful initiatives to reduce the proportion of the population that is obese, that smokes, and that is physically inactive would reduce the numbers with chronic conditions and the associated need for health care services. Indeed a number of US studies have found substantial reductions in the prevalence rates in the last decade and more[15]. That leads us to consider hypothetical situations in

[14] The quotation is from the World Health Organization website http://www.who.int/dietphysicalactivity/publications/facts/riskfactors/en/index.html

[15] For example, Manton and Gu (2001) found an increasing rate of decline in chronic disability, ranging from 0.26 percent per year in 1982-89 to 0.56 percent in 1994-99. Specific chronic conditions, perhaps including heart disease, cancer, and high blood pressure, are likely to respond even more to lifestyle changes of the sort identified. But even in the case of conditions that may be less responsive to possible changes in lifestyle, Langa et al. (2008) found that among Americans aged 70 and older the prevalence of cognitive impairment (a term used to describe a range of conditions ranging from memory loss to dementia and Alzheimer's disease) went down 3.5

which the population observed in the survey had fewer chronic conditions (perhaps as a result of changes in lifestyle or policy initiatives taken many years earlier), and to infer the impact that would have had on the use of health care resources.

Table 7 shows the percent reductions in selected health care services that would have resulted in 2005 if, within each age group in Table 4, a fraction of those with one chronic condition shifted to having none, of those with two shifted to having only one, and so on. The fractions assumed to be shifted are one-quarter, one-half, three-quarters, and one. There is, of course, wide variation in chronic conditions. Some are highly debilitating, others not; some are costly to treat in terms of the health care resources that they use while others are not. Implicit in the calculations that follow, those remaining in each age category have the same combination of chronic conditions as before the assumed shift, and the same health care resources are used in their treatment. In similar fashion, those that are shifted down a category are assumed to have the same combination of conditions as those already in that category, and their care is assumed to involve the same health care resources.[16]

It is evident that the savings from even a modest reduction in the prevalence of chronic conditions would be substantial. For example, patient nights are reduced by about 16 percent and consultations with family physicians by 10 percent if only half of those with the specified number of chronic conditions are moved to the next lowest category. As an indication of magnitudes, those amounts are equivalent to *more than a third* of the projected increase in requirements for the same services by 2030 with prevalence rates

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percentage points (from 12.2 to 8.7) between 1993 and 2002. For the population aged 65 and older Manton and Gu (2005) found an average annual rate of decline in dementia prevalence over the period 1982-99 between 5.7 and 2.9 percent, depending on the definition used.

[16] In practice, of course, a decline in the overall prevalence of chronic conditions would not be uniform: the prevalence of some conditions would decline more rapidly, others less rapidly, and some might even increase. We abstract from such complications by assuming a uniform decline.

held constant (see Table 6). The potential savings are somewhat larger for other physician specialists, smaller for eye specialists, but nonetheless significant.

Not all (perhaps not even most) chronic conditions are preventable, but Table 7 is indicative of the potential reduction in resource requirements that could result over the longer term if fewer people were subject to the risk factors associated with chronic conditions.

5. Concluding Remarks

Health costs continue to grow more rapidly than most other components of public budgets. How much of those budgets, and the increases in them, are accounted for by the treatment of chronic conditions is hard to answer – especially given the uncertainty about what conditions should be included in the chronic category. However, by any reasonable definition the share is large.

Working with a somewhat arbitrarily defined set of 32 chronic conditions drawn from a large household survey, we find that the prevalence rates for almost half of the conditions increase with age and that the age patterns are strong. For example, there are nine conditions for which the prevalence rates are more than 10 times greater for the oldest age group (those 80+) than for those aged 30-49. We ask how the overall population prevalence rates would change over a quarter century, as the population ages, if the rates for each age group remained constant. Consistent with recent demographic trends, we project that the rates for almost all conditions that are associated mostly with old age would rise by more than 25 percent.

Recent survey data show that resource use increases strongly with age and number of chronic conditions. If the number of conditions were to be maintained our projection indicates that health care requirements would grow more rapidly than the population – more than twice as rapidly in the case of hospital stays.

The age patterns of both chronic conditions and resource usage will, of course, change, as will the relationship between them. What form those changes will take is uncertain, but we have explored the implications of hypothetical reductions in the average number of conditions at each age. We find that even modest reductions could result in substantial savings.

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Figure 1: Prevalence Rates for Chronic Conditions Associated with Old Age, 2005

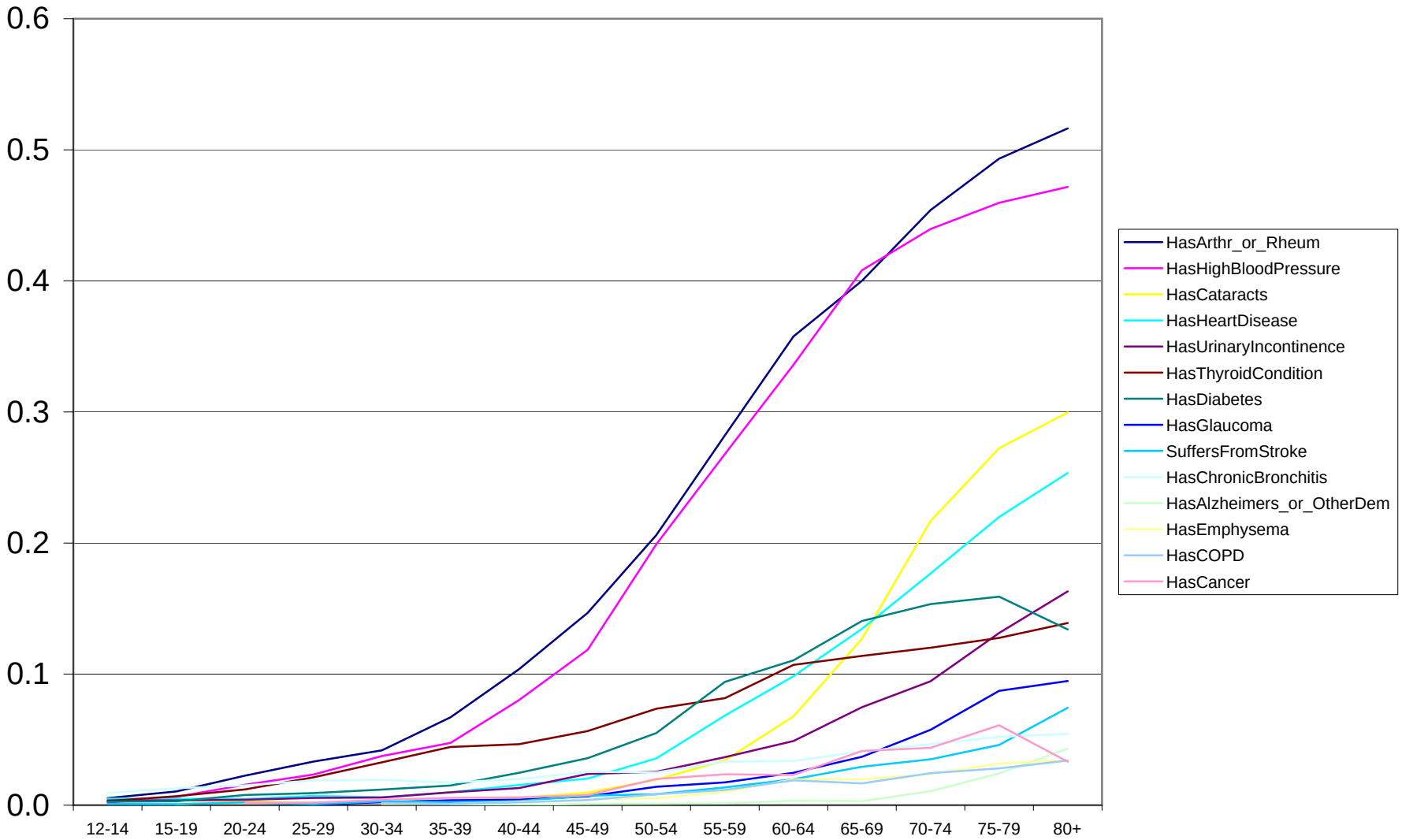

Table 1: Prevalence of Chronic Conditions by Age Group, 2005

	Prevalence Rate (%)						Relative Prevalence				
Condition	12-29	30-49	50-64	65-79	80+	All ages	12-29	30-49	50-64	65-79	80+
HasAlzheimers_or_OtherDem	0.0	0.1	0.2	1.1	4.3	0.3	0.3	1.0	3.2	19.4	74.3
HasCataracts	0.2	0.5	3.8	19.6	30.0	4.2	0.3	1.0	6.9	35.7	54.6
HasGlaucoma	0.0	0.4	1.8	5.7	9.5	1.5	0.1	1.0	4.1	13.1	21.7
HasHeartDisease	0.5	1.3	6.4	17.1	25.3	4.7	0.4	1.0	4.8	12.8	18.9
SuffersFromStroke	0.1	0.4	1.3	3.6	7.4	1.1	0.3	1.0	3.3	9.0	18.8
HasCOPD	0.0	0.2	1.2	2.2	3.4	0.7	0.0	1.0	5.5	10.0	15.2
HasEmphysema	0.0	0.2	1.1	2.4	3.4	0.7	0.0	1.0	4.6	10.3	14.6
HasUrinaryIncontinence	0.4	1.4	3.6	9.6	16.3	3.0	0.3	1.0	2.6	7.1	12.0
HasCancer	0.1	0.5	2.1	4.6	5.7	1.4	0.2	1.0	4.2	9.3	11.4
HasHighBloodPressure	1.3	7.3	26.0	43.2	47.2	14.9	0.2	1.0	3.5	5.9	6.4
HasDiabetes	0.6	2.3	8.3	15.0	13.4	4.9	0.3	1.0	3.7	6.6	5.9
HasArthr_or_Rheum	1.9	9.3	27.3	44.3	51.6	16.4	0.2	1.0	2.9	4.8	5.5
HasThyroidCondition	1.2	4.6	8.5	12.0	13.9	5.6	0.3	1.0	1.9	2.6	3.0
HasChronicBronchitis	1.5	2.1	3.0	4.6	5.4	2.5	0.7	1.0	1.5	2.2	2.6
HasBowelDisorder	1.9	4.1	4.9	5.2	6.6	3.9	0.5	1.0	1.2	1.2	1.6
HasStomach_or_IntestUlcers	1.6	3.1	4.1	4.7	4.8	3.1	0.5	1.0	1.3	1.5	1.5
OtherLongTermCondition	7.1	12.1	17.0	17.9	17.9	12.6	0.6	1.0	1.4	1.5	1.5
HasChronicFatigueSyn	0.4	1.2	1.9	1.8	1.6	1.2	0.3	1.0	1.6	1.5	1.3
HasBackProblems	10.6	19.9	24.7	23.1	23.6	18.8	0.5	1.0	1.2	1.2	1.2
HasFibromyalgia	0.2	1.4	2.8	2.1	1.5	1.4	0.1	1.0	2.1	1.6	1.1
HasFoodAlergies	7.4	7.4	7.3	6.6	6.5	7.2	1.0	1.0	1.0	0.9	0.9
SuffersMultChemSensitivities	1.0	2.2	3.5	3.1	1.9	2.2	0.4	1.0	1.6	1.4	0.9
HasAutism_or_OtherDevDis	0.6	0.2	0.1	0.1	0.2	0.3	3.6	1.0	0.5	0.3	0.9
HasAsthma	10.6	7.5	7.2	7.7	6.4	8.3	1.4	1.0	1.0	1.0	0.9
HasNonFoodAlergy	28.4	27.2	26.5	23.0	19.1	26.6	1.0	1.0	1.0	0.8	0.7
HasEpilepsy	0.5	0.6	0.7	0.5	0.4	0.6	0.8	1.0	1.0	0.8	0.7
HasMoodDisorder	4.2	6.5	6.8	4.3	4.0	5.6	0.7	1.0	1.1	0.7	0.6
EatingDisorder	0.7	0.4	0.3	0.2	0.2	0.4	1.8	1.0	0.7	0.7	0.6
HasAnxietyDisorder	3.9	4.8	5.1	3.6	2.2	4.4	0.8	1.0	1.1	0.7	0.5
HasSchizophrenia	0.1	0.4	0.4	0.1	0.1	0.3	0.3	1.0	1.1	0.3	0.3
HasLearningDisability	5.5	2.1	1.5	0.9	0.6	2.8	2.6	1.0	0.7	0.4	0.3
HasMigraineHeadaches	10.7	13.3	10.0	4.6	3.0	10.5	0.8	1.0	0.8	0.3	0.2
HasChronicCondition	54.5	64.8	79.3	90.0	93.3	68.7	0.8	1.0	1.2	1.4	1.4

Note: This tabulation was prepared in the Statistics Canada Research Data Centre at McMaster University. It is based on the master file of the Canadian Community Health Survey, Cycle 3.1. Observations have been weighted to provide estimates for the target population for the Survey.

Table 2: Projected Population Size and Percentage Distribution by Age Group, 2005-2030

Year	Percentage distribution					Total
	12-29	30-49	50-64	65-79	80+	Size
						(' 000)
2005	28.4	35.8	21.4	11.3	3.2	27,132
2010	27.2	33.6	23.8	11.8	3.5	28,673
2015	25.5	32.0	25.2	13.7	3.7	29,873
2020	24.1	31.6	24.8	15.8	3.8	30,929
2025	22.9	31.6	23.5	17.9	4.1	31,846
2030	22.6	30.9	22.3	19.2	4.9	32,549

Note: The 2005 values show the population targeted in the CCHS. The projected population holds fertility and mortality rates constant at 2005 levels, immigration at 240,000 per year, and emigration at 0.13% of the population.

Table 3: Population with Chronic Conditions, 2005, and Projected Prevalence Rates to 2030

Condition	Population (' 000)	Prevalence Rate (%) 2005	2010	2015	2020	2025	2030
HasAlzheimers_or_OtherDem	90	0.3	0.3	0.4	0.4	0.4	0.5
HasCataracts	1,144	4.2	4.5	4.9	5.4	5.9	6.3
HasGlaucoma	407	1.5	1.6	1.7	1.8	2.0	2.1
HasHeartDisease	1,288	4.7	5.0	5.4	5.8	6.2	6.6
SuffersFromStroke	299	1.1	1.2	1.2	1.3	1.4	1.5
HasCOPD	191	0.7	0.8	0.8	0.9	0.9	0.9
HasEmphysema	190	0.7	0.8	0.8	0.9	0.9	1.0
HasUrinaryIncontinence	809	3.0	3.1	3.3	3.5	3.8	4.0
HasCancer	371	1.4	1.4	1.5	1.6	1.7	1.8
HasHighBloodPressure	4,053	14.9	15.8	16.9	17.8	18.6	19.1
HasDiabetes	1,325	4.9	5.2	5.5	5.9	6.1	6.3
HasArthr_or_Rheum	4,443	16.4	17.3	18.3	19.2	20.0	20.6
HasThyroidCondition	1,516	5.6	5.8	6.1	6.3	6.5	6.6
HasChronicBronchitis	675	2.5	2.5	2.6	2.7	2.7	2.8
HasBowelDisorder	1,047	3.9	3.9	4.0	4.0	4.1	4.1
HasStomach_or_IntestUlcers	847	3.1	3.2	3.3	3.3	3.4	3.4
OtherLongTermCondition	3,417	12.6	12.8	13.1	13.3	13.4	13.5
HasChronicFatigueSyn	334	1.2	1.3	1.3	1.3	1.3	1.3
HasBackProblems	5,091	18.8	19.0	19.3	19.5	19.6	19.6
HasFibromyalgia	390	1.4	1.5	1.5	1.6	1.6	1.6
HasFoodAlergies	1,965	7.2	7.2	7.2	7.2	7.2	7.2
SuffersMultChemSensitivities	599	2.2	2.3	2.3	2.3	2.4	2.4
HasAutism_or_OtherDevDis	76	0.3	0.3	0.3	0.2	0.2	0.2
HasAsthma	2,250	8.3	8.2	8.2	8.1	8.1	8.1
HasNonFoodAlergy	7,223	26.6	26.6	26.5	26.3	26.2	26.1
HasEpilepsy	160	0.6	0.6	0.6	0.6	0.6	0.6
HasMoodDisorder	1,514	5.6	5.6	5.6	5.6	5.5	5.5
EatingDisorder	110	0.4	0.4	0.4	0.4	0.4	0.4
HasAnxietyDisorder	1,187	4.4	4.4	4.4	4.4	4.3	4.3
HasSchizophrenia	69	0.3	0.3	0.3	0.3	0.3	0.2
HasLearningDisability	753	2.8	2.7	2.6	2.5	2.5	2.5
HasMigraineHeadaches	2,861	10.5	10.4	10.3	10.1	9.9	9.8
HasChronicCondition	18,644	68.7	69.4	70.3	70.9	71.5	71.9

Note: See note to Table 1.

Table 4: Percentage Distribution of the Population by Number of Chronic Conditions and Age Group, 2005

Age Group	Number of Chronic Conditions								
	0	1	2	3	4	5	6	7+	All
	-- percentage distribution --								
12-29	45.5	27.7	15.0	6.4	3.0	1.3	0.5	0.6	100.0
30-49	35.2	28.4	16.6	8.9	5.0	2.7	1.2	1.9	100.0
50-64	20.7	24.7	20.3	13.5	8.6	5.0	2.9	4.4	100.0
65-79	10.0	18.6	20.3	17.4	13.0	8.8	4.6	7.3	100.0
80+	6.7	14.9	18.1	18.2	14.9	10.4	6.9	9.9	100.0
All ages	31.3	25.9	17.4	10.4	6.4	3.7	2.0	2.9	100.0

Table 5: Use of Health Care Resources in Previous Twelve Months by Number of Chronic Conditions and Age Group, 2005

Age Group	Number of Chronic Conditions								
	0	1	2	3	4	5	6	7+	All
	Number of nights as patient in hospital, nursing home or convalescent home								
12-29	0.1	0.2	0.5	0.8	1.2	3.6	1.6	1.7	0.3
30-49	0.1	0.2	0.3	0.8	0.8	0.9	1.6	2.3	0.4
50-64	0.2	0.3	0.4	0.6	1.0	1.5	1.6	3.6	0.6
65-79	0.5	0.6	1.0	1.3	1.4	1.9	2.9	4.7	1.4
80+	0.9	1.2	2.3	2.0	2.8	3.7	4.2	6.4	2.7
All ages	0.1	0.3	0.5	0.9	1.2	1.8	2.3	3.8	0.6
	Number of family physician consultations								
12-29	1.8	2.4	3.2	4.2	5.7	6.5	7.8	11.8	2.6
30-49	1.6	2.4	3.4	4.0	5.2	7.4	7.7	10.6	2.9
50-64	1.4	2.1	3.1	4.0	4.5	5.9	6.4	8.7	3.2
65-79	1.6	2.8	3.5	4.3	4.6	5.5	5.9	7.0	4.0
80+	3.0	3.6	4.9	4.5	5.4	6.3	5.9	8.0	5.1
All ages	1.7	2.4	3.3	4.1	4.9	6.3	6.6	8.8	3.1
	Number of eye specialist consultations								
12-29	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
30-49	0.3	0.4	0.4	0.5	0.5	0.6	0.5	0.6	0.4
50-64	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.9	0.6
65-79	0.6	0.6	0.8	0.9	1.0	1.0	1.4	1.3	0.9
80+	0.6	0.8	1.0	1.1	1.1	1.4	1.2	1.3	1.1
All ages	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0	0.5
	Number of other medical doctor consultations								
12-29	0.3	0.6	0.8	1.3	1.6	3.9	4.1	4.4	0.7
30-49	0.4	0.7	1.0	1.4	1.8	2.5	2.4	4.2	0.9
50-64	0.3	0.6	0.9	1.1	1.4	1.9	2.7	3.6	1.0
65-79	0.3	0.6	0.8	0.9	1.1	1.4	1.6	1.9	1.0
80+	0.4	0.5	0.7	0.8	1.0	1.1	1.3	1.9	0.9
All ages	0.4	0.7	0.9	1.2	1.4	2.0	2.3	3.1	0.9

Table 6: Projected Effects of Population Change on the Use of Health Care Resources with Prevalence Rates Held Constant, 2005-2030

Resource	2005	2010	2015	2020	2025	2030
			(Indexes, 2005 = 100.0)			
Nights as patient	100.0	109.1	118.5	127.0	135.9	144.7
Family Physician Consultations	100.0	106.5	112.1	117.0	121.6	125.4
Eye Specialist Consultations	100.0	107.2	113.7	119.5	125.0	129.9
Other Medical Doctor Consultations	100.0	106.4	111.6	116.0	119.8	122.5

Table 7: The Effects of Hypothetical Reductions in the Prevalence of Chronic Conditions on the Use of Health Care Resources, 2005

Resource	Percent reduction in proportion with 1, 2, …, CCs			
	25	50	75	100
	% change			
Nights as patient	-7.8	-15.6	-23.4	-31.2
Family Physician Consultations	-4.9	-9.7	-14.6	-19.5
Eye Specialist Consultations	-2.0	-4.0	-5.9	-7.9
Other Medical Doctor Consultations	-6.4	-12.8	-19.3	-25.7

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